

MUST News

Department of Environmental Quality

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Montana piloting UST cleanups under EPA program

*M*ontana has two petroleum-contaminated sites designated for cleanup with funding as pilot projects under the U.S. Environmental Protection Agency's USTfields Initiative.

The Montana Department of Environmental Quality's Petroleum Release Section is in a partnership with the city of Billings to assess abandoned gas stations along First Avenue South, a main traffic artery targeted for redevelopment. The route could be attractive for residential properties and commercial businesses if the degraded sites can be cleaned up.

Montana's Crow Tribe also has EPA USTfields pilot funding to deal with cleanup of underground storage tanks at the Pryor Trading Post, an abandoned gas station in Pryor about 30 miles south of Billings.

Until recently, cleanup of petroleum contamination has generally been excluded from funding through the EPA's Brownfields Program. Brownfields are abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. Through its Brownfields Initiative, the EPA empowers states, communities, and other stakeholders in economic development to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse Brownfields.

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Montana piloting UST - *continued from page 1*

Four years ago, based on its success with the Brownfields Program, EPA created USTfields to focus on abandoned petroleum sites. Montana's two sites were among 40 throughout the nation selected two years ago as EPA's USTfields Pilots. Each pilot was awarded up to \$100,000 of Leaking Underground Storage Tank Trust funds to assess and clean up petroleum-contaminated sites.

Future costs of the USTfields Initiative pilot projects will be paid through the EPA's Brownfields Program. Coordinator of the Montana DEQ's USTfields Initiative pilot projects is Jeff Kuhn, (406) 841-5055, e-mail: jkuhn@state.mt.us

The Montana DEQ's Brownfields coordinator is Kelly Schmitt, (406) 841-5070, e-mail: kschmitt@state.mt.us

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UST permit application update

The long-awaited rollout of the new underground storage tank permit applications is here. The new and improved applications are shorter and easier to use because they are adjustable to each type of project. It's no longer the one-size-fits-all approach found in the long, blue application. Many installer/removers are already using draft versions of the revised applications. Feedback regarding the new applications has been positive and suggestions from users have been implemented throughout the revision process.

Official rollout of the new applications was mid-July. A packet to be mailed to all licensed installer/removers and includes an introductory letter, hard copies of the revised permit applications, guidance documents explaining how to complete the applications correctly, and a reference list containing commonly overlooked permit conditions such as Critical Installation Elements. The new applications will be available for download from the DEQ website (<http://www.deq.state.mt.us/UST>).

For more details on the new applications and modified permits contact Bill Rule, manager of the Montana Underground Storage Tank Section, (406) 444-0493, or e-mail: brule@state.mt.us

UST permits get a new look, too

In conjunction with the rollout of the new underground storage tank permit applications, the installation and removal permits have also been modified.

In the past, permits contained conditions that were customized to each installation or removal. A permit to install a new tank included a list of requirements, such as the tank burial depth and the type of backfill to use, based on a staff review of the proposed project. These permit conditions are, in fact, department-adopted industry standards that installers must follow for every permitted activity—regardless of whether they are listed on the permit.

The new permits will contain a minimal number of permit conditions, mostly regarding functional tests of equipment and systems as well as some site-specific design considerations. It will now be up to designers and installers to follow all adopted references and standards delineated by Administrative Rules of Montana, Title 17, Chapter 56, including API Recommended Practice 1615 and PEI/RP 100-2000.

To assist designers and installers with this transition, a list of Critical Installation Elements will be distributed with the new permit application packet. The list serves only to emphasize some of the most overlooked issues in the installation of UST systems and *does not* serve as a replacement or supplement to industry standards.

The new process will include an increase in installation inspections by UST Section staff to ensure that permitted work is done correctly and according to the required design standards.

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The problem with sumps

By Marcel Moreau

Reprinted from LUSTLine Bulletin 35

The following stories are true. Only the names and a few details have been changed to keep me out of trouble. Both incidents happened at state-of-the-art, double-walled storage systems with continuous interstitial monitoring.

Story No. 1 — A sigh of relief becomes a groan of despair

A line-leak detector is tripping frequently, so the owner calls his installer to come and have a look. The installer discovers a leaking union at the submersible pump and tightens it up. There is a small amount of product in the bottom of the sump, which the installer cleans up. The owner and installer are very glad to have secondary containment, because they have caught the problem in time, there has been no leakage, and so there is no need for a site assessment to determine the level of contamination. A few days later, however, product appears in a nearby drainage ditch. A review of recent inventory records for the tank with the newly repaired leak indicates that a substantial amount of product is unaccounted for. After some investigation and head scratching, the tank sump is filled with water. The water quickly disappears from the sump. As it turns out, the fitting that connects the bottom of the sump to the tank is leaking. Because the leak rate out of the sump is larger than the rate of product leaking into the sump, the product depth in the sump is never sufficient to trigger the sump sensor. ■

Story No. 2 — A chain is only as strong as its weakest link

The well water at a convenience store starts to taste funny, so a sample is sent to a lab for analysis. That funny taste turns out to be gasoline. The site had never had storage tanks until the current system was installed less than a year before. All primary system components reportedly tested tight. No alarms have been reported. The contamination assessment traces the product back to the middle of three dispensers, where a small amount of product is found in the sump. The only leak detection sensor in the system is located back at the tank top sump. For the leak to be detected, the product would have to accumulate in the middle dispenser sump, flow through the secondary piping to the first dispenser sump, fill this dispenser sump to the level of the piping entry, and then flow down the piping run to reach the tank top sump. For this scheme to work, all dispenser sump penetrations, all dispenser sumps, and all secondary piping must be liquid tight. Any weak link in the chain means the escape of product into the environment undetected. A water test of the middle dispenser sump reveals that there is a leak at a penetration fitting for the piping. ■

Based on comments from regulators from various parts of the country, it seems that these incidents are not unique and that similar stories are relatively commonplace. How did we get here?

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Why sumps were born

Initially, sumps presented a simple and elegant solution to an early problem in the implementation of secondary containment for piping.



Putting pipe within a pipe was a simple enough problem to solve, but there was always the question of what to do when you got to the tank end of the pipe.

There were two issues: 1) What to do about terminating the secondary containment to enable leak detection, and 2) What to do about the single-walled section of pipe that remained between the submersible pump manifold and the beginning of the secondarily contained pipe. This single-walled section of piping almost invariably contained a union, and most everyone recognized that leaking unions were a problem. Leaks from the submersible pump itself were also a recognized problem. The seemingly simple solution was to put a liquid-tight container around the entire submersible pump and terminate the secondary piping at the sump wall. This sump would serve as a containment vessel for leaks from the submersible manifold as well as from the immediately adjacent piping; it would also serve as a receptacle for any leaked product that might flow down the secondary containment piping.

The sump could be equipped with sensors for leak detection, and any product that accumulated could be removed easily. It was a solution that was too good to be true. However, the first sumps brought to market appeared to have been designed without a realistic appraisal of the challenges involved in building a subterranean, liquid-tight chamber with numerous penetrations that is surrounded by loose gravel and likely to be installed in a humid climate. The first such attempts were neither liquid-tight nor

structurally sound, but they did demonstrate that the concept had merit.

Recently, generations of sump designs, penetration fittings, and methods of attaching the sump to the tank top have been developed, but it still seems that many of the designs, though they have benefited from some engineering expertise, are flawed.

Here lies the problem

The main problem with sumps has to do with keeping the sump liquid-tight. Areas of inherent “untightness” include the following:

Water entry via the lid

Water entry via loose or inadequately sealed lids is most commonly the result of the infiltration of precipitation, but it can also be due to a very high water table. The challenge is to create a liquid-tight joint that can be made up and taken apart on at least an annual basis to test the line-leak detector. The joint typically relies on gaskets or flexible seals of some type, which is a problem because of the proximity of grit and dirt that can interfere with a proper seal. Pressure is also typically required to seal the joint, and finding ways to quickly and evenly apply pressure can be a challenge. Joints that are difficult to reassemble are not likely to be reassembled properly.

Water entry/product exit via fittings designed to seal around the pipe where it enters the sump

The engineering of these fittings has improved greatly over the years, but the problem is often traceable to improper installation of the fitting. Problems range from drilling the wrong-size hole in the sump, to over- or under-tightening of clamps



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around the piping, to tearing the fitting a result of abuse or mishandling.

Water entry/product exit via electrical conduit penetrations

This often occurs when the electrician is a separate contractor who does not understand the need to keep sumps liquid-tight and fails to use appropriate fittings to run the conduit through the sump wall.

Water entry/product exit via the connection between the tank top and the sump bottom

Fiberglass tanks with factory-installed sump mounting rings to which the sump is glued seem to work pretty well (as long as the adhesive is properly applied), but steel and jacketed tanks that require the sump to be attached to the four-inch tank opening are often a source of problems. Because this joint is so critical to effective leak detection, a more fail-safe engineering solution needs to be developed.

Other problems stem from failure to properly support sump bottoms with backfill, choosing a sump or sump lid that is not suited to the field conditions (e.g., extremely high water table), and failure to properly repair holes that are mistakenly drilled into the sump.



Because water entry often leads to frequent false alarms and ignoring of alarm conditions, it is a significant obstacle to the effectiveness of secondary containment as a leak-detection method. Product leaks from the sump, of course, completely defeat the purpose of secondary containment.

Solutions to the leaking sump problem include installing smaller retrofit sumps inside the existing sump, applying sealant compounds around the

sump penetrations, and tearing out the old sump and starting over. Storage system owners frustrated by frequent water entry all too often resort to ignoring the problem entirely and thereby compromising their leak detection ability, or abandoning their secondary containment and utilizing potentially less effective leak detection methods, such as lineleak detectors and annual tightness testing. Problems associated with product (and often water) leaking out of sumps typically go unnoticed until it is too late.

To leak is human, to detect divine

In hindsight, is it any wonder that it is so difficult to keep sumps tight when we have had such difficulty keeping primary piping tight? Though there is certainly room for improvement in the engineering and installation of sumps, the possibility of leakage will always be present. Testing sumps at installation and periodically for the life of the storage system would seem to be a sensible approach to dealing with this issue, but such testing is not a widespread practice.

In reviewing the installation instructions from some of the leading sump manufacturers, I was surprised to learn that some instructions do not call for any testing of the sumps at installation, let alone during the life of the system. Florida currently requires sump testing at the time of installation, and California, in response to the problems described here, is heading down the road of requiring periodic sump tightness testing. The 2000 edition of PEI RP100 will specify that sumps should be tested according to the manufacturer's instructions before a facility is started up.

When will it end?

I can hear the groans of storage system owners already: "Oh no, not another thing that I have to test! When will it end?" Let's face it, life is difficult. So do we accept that and deal with it? Or do we just complain? Operating a storage system responsibly is a task that requires dedication, perseverance, and money. Given the road we have

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chosen to travel with storage systems, there is no acceptable alternative.

The soap box

The replacement (not upgrading) of bare steel tanks with corrosion-protected tanks has, at least for now, fairly effectively dealt with the issue of leaking tanks. I would venture to guess that better than 95 percent of today's leaks stem from pressurized piping. Though I doubt that anyone will take me seriously, I am convinced that if suction pumps were the dominant technology today, the leaking piping problem (which is what creates the need for tank top sumps in the first place) would not exist.

Suction systems still dominate in much of Europe, and I would wager that European gas stations are

every bit as big and pump just as much product as American stations.

Though many would consider it a step backward, it would clearly benefit the environment and, I believe, in the long term the tank owner, if we were to take a cue from our European brethren and adopt intrinsically safe suction systems as the product pumping system of choice. A conversion to suction pumps is not likely to happen through regulation, nor is the petroleum marketing industry likely to adopt such a change voluntarily. But perhaps insurance companies (or maybe even state cleanup funds) could at least reward those who choose suction pumping systems by charging them substantially lower insurance premiums.

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A glance at the history of the petroleum storage tank

*Adapted from a speech earlier this year by Robert Renkes
Executive Vice President
Petroleum Equipment Institute*

Let's take a brief look at the evolution of the petroleum storage tank.

We have been storing oil and petroleum products for over 140 years. The locals in Titusville, Pennsylvania, used tubs, washbasins, and whiskey barrels to collect and contain crude oil from the first well in 1859.

As the automobile industry grew, so did service stations. The stations that appeared on the scene in the early 1900s had minimal storage capacity. At the turn of the century, Sylvanus Bowser sold a "self-measuring gasoline tank" that delivered coal oil from a barrel for \$10. It wasn't long before Bowser pumps were used to dispense gasoline from 50-gallon containers permanently placed outside in a wooden cabinet.

As urban areas became more congested, underground tanks became a more popular choice for

petroleum storage. The first underground tank was installed in 1902. It allowed service station owners to use the real estate for more productive purposes, kept the area safe from vandalism and vehicle collision, and was more aesthetically pleasing.

If the installation and operation of underground storage tanks were regulated at all, responsibility



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usually rested with local fire officials. Occasionally, communities issued local fire regulations defining how storage tanks should be handled. The National Fire Protection Association, a publisher of recommended codes dealing with fire safety, issued NFPA 30L for the first time in 1913. The Inflammable Liquids Code, as it was known back then, was the first code to deal with tanks greater than 250 gallons and was incorporated by reference in the fire codes as the basic regulation for underground tanks.

The first steel tanks were small, made of galvanized steel, and riveted. Arc welding replaced the riveting process in the 1920s and 1930s. World War II created a shortage of galvanized steel and the industry turned to black carbon steel. During the 1950s, manufacturers generally coated steel tanks with red lead primer or a thin asphaltum-based paint. Although such coatings prevented atmospheric corrosion, they were nearly useless for protection against corrosion in many underground environments.



Early entrepreneurs, such as Roger Wheeler of Tulsa, introduced magnesium anode design kits into the market in the mid-1950s. His company, Standard Magnesium, exhibited at PEI's trade show from 1952 to 1955, but stopped supplying the market when not enough tank owners bought his anodes.

The first fiberglass-reinforced plastic tanks were marketed by Owens-Corning in 1965. FRP-coated steel tanks made their first appearance in 1968. The STI P3 design—which included a dialectic coating of the outer shell, galvanic magnesium anodes and isolation of the tank from steel piping—was introduced in 1969. By the end of the decade our industry was able to produce a variety of tanks that would not corrode in the ground.

The equipment industry knew in the 1970s that we had a problem with corroding tank systems. In a speech in 1975, my predecessor Howard Upton predicted that state and federal controls related to

tank leaks and piping leaks would proliferate. He also said in the same speech that EPA was here to stay and that we would have to learn to work with the regulators. He was right on target.

About the same time, the American Petroleum Institute's Operations and Engineering Committee recognized that underground storage tank leaks presented a growing industry problem, and formed a task force to recommend procedures for detecting and dealing with leaks. API studied the underground tank problem from 1977 to 1980. In a report published in February of 1981, API reported that its members did not have a single leak in a tank protected by sacrificial anodes and that the only failures of FRP tanks were the result of installation errors. In other words, the new state-of-the-art tanks developed in the mid- and late-1960s worked. Still, after 15 years of commercial availability, less than 10 percent of all tanks in the ground were protected from corrosion.

Tank failure and leakage of stored product did occur, sometimes resulting in serious environmental damage.

Emphasis shifted in the early 1980s from tank regulations for safety reasons to regulations for protecting the environment and public health. Congress stepped in, and EPA was directed to establish programs to prevent, detect, and clean up releases from UST systems containing petroleum or hazardous substances in 1984. And, as you know, UST regulations were promulgated in 1988.

Where are we today? For starters, one and a half million USTs have been closed and almost 285,000 petroleum leaks have been cleaned up. Today, we have better equipment in-place and most of the UST systems are equipped with cathodic protection, leak detection and overfill prevention. You can be proud of your accomplishments. The decisions you made 20 years ago and throughout the program's history have served the country well. Without a doubt, our environment is better because of your work.

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Meet Frank Schumacher

One in a continuing series of get-acquainted articles on members of the Montana Petroleum Tank Release Compensation Board

Frank Schumacher, 54, of Great Falls, is a division manager for Mountain View Co-op. With a degree in agricultural engineering from the University of Idaho, Frank previously worked as a marketing manager for a national agronomy inputs company.

When asked if he has any goals he would like to see the Petro Board accomplish during his term as a board member, Frank said: "The Petro Fund administered by the Petro Board has made a big difference in making petroleum cleanup affordable for all petroleum dealers and improved the environment for

the residents of Montana. I hope my part on the board can help to produce similar results in the future."

Frank has been a Montana resident for 10 years. He and his wife, Lynn, have been married 30 years. They have three sons: Matt of Las Vegas, Andy, a student at Montana State University in Bozeman, and Brent who will be a freshman at MSU this fall.

Frank's hobbies are woodworking, golf and family activities.

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